REMARKS

The present application was filed on December 27, 2001. In a previous Office Action, the Examiner required election of claims. Subsequently, Applicants elected the claims of Invention I (claims 1-28) without traverse and canceled claims 29-38. In the present Response, Applicants cancel claim 2 and amend claims 1 and 14. Claims 1 and 3-28 are therefore pending. The amendments are supported, e.g., by originally filed claims 2 and 25; page 5, line 17 to page 6, line 2; page 11, line 21 to page 12, line 10; and page 14, line 4 to page 18, line 6.

In the present Office Action, the Examiner rejected claims 1-28 as being anticipated by Jain et al., U.S. Patent No. 5,915,250.

In the present Response, Applicants cancel claim 2 and incorporate the subject matter of claim 2 into claim 1. In particular, claim 1 now recites the following: "deriving a set of perceptual semantic categories for representing important semantic cues in the human perception of images, where each semantic category is modeled through a combination of perceptual features that define the semantics of that category and that discriminate that category from other categories, wherein the perceptual features and their combinations are derived at least in part through subjective experiments performed with human observers" (emphasis added). Original, unamended independent claim 25 also recites similar subject matter: "program instructions for processing a set of perceptual semantic categories for representing semantic cues related to the manner in which human observers perceive and organize images, the semantic categories ... comprising a combination of perceptual features that define the semantics of a particular category and that discriminate that category from other categories, where the perceptual features and their combinations are derived through subjective experiments performed with human observers" (emphasis added).

Similar subject matter is also found in original independent claim 14. Claim 14 originally recited the following: "said data processor operating in accordance with a stored program for determining the semantic meaning of images in accordance with a set of perceptual semantic categories that were previously derived from human observers and that

represent important semantic cues in the human perception of images" (emphasis added). To present this claim in a better form for consideration on appeal, Applicants have amended this claim as follows: "said data processor operating in accordance with a stored program for determining the semantic meaning of images in accordance with a set of perceptual semantic categories that were previously derived at least in part through subjective experiments performed with~~from~~ human observers and that represent important semantic cues in the human perception of images" (emphasis added). In this manner, amended claim 14 reduces issues for appeal and parallels the subject matter in claims 1 and 25.

It is noted that the previous Response specifically argued that dependent claim 2 was patentable over Jain. As noted above, the subject matter of claim 2 has been incorporated through amendment into amended independent claim 1 and to amended independent claim 14. Similar subject matter already was included in originally filed, unamended independent claim 25. Furthermore, in the outstanding final Office Action, the Examiner specifically responded to the argument regarding claim 2:

> Regarding claim 2, the Applicant argues (top of page 14) that there is no disclosure in Jain that teaches "the perceptual features and their combinations are derived through subjective experiments performed with human observers". The Examiner respectfully disagrees. Again, as discussed the claim l's argument, the claim's language are broadly claimed and that the Examiner can give broadest reasonable interpretation without reading the specification into the claim. Furthermore, the specification also gives a limitless definition regarding perceptual features/semantic cues/categories (as discussed in claim 1). Therefore, Jain clearly teaches the perceptual features (such as color, texture, shape, pattern, and object that are visual to human/user) and their combinations (column 4, lines 1-45) are derived through subjective experiments (the process of obtaining similar properties) performed with human observers (column 4, lines 1-45).

Outstanding Office Action, pages 2-3. Therefore the amendments to claim 1 and claim 14 should not be surprising and should be allowed for purposes of appeal.

Regarding the Examiner's rejection above to claim 2 (the subject matter of which now resides in claim 1), Jain at col. 3, line 59 to col. 4, line 57 states the following:

The above needs are satisfied by the present invention which is directed to a system and method for "content-based" image retrieval, a technique which explicitly manages image assets by directly representing their visual attributes. A visual information retrieval (VIR) Engine provides an open framework for building such a system. A visual feature is any property of an image that can be computed using computer-vision and image-processing techniques. Examples are hue, saturation, and intensity histograms; texture measures such as edge density, randomness, periodicity, and orientation; shape measures such as algebraic moments, turning angle histograms, and elongatedness. Some of these features are computed globally, i.e., over an entire image, and some are local, i.e., computed over a small region in the image. The VIR Engine expresses visual features as image "primitives". Primitives can be very general (such as color, shape, or texture) or quite domain specific (face recognition, cancer cell detection, etc.). The basic philosophy underlying this architecture is a transformation from the data-rich representation of explicit image pixels to a compact, semantic-rich representation of visually salient characteristics. In practice, the design of such primitives is non-trivial, and is driven by a number of conflicting real-world constraints (e.g., computation time vs. accuracy). The VIR Engine provides an open framework for developers to "plug-in" primitives to solve specific image management problems.

Various types of visual queries are supported by the VIR Engine as follows:

Query by image property, wherein a user specifies a property or attribute of the image, such as the arrangement of colors, or they may sketch an object and request the system to find images that contain similar properties. The Engine also allows the user to specify whether or not the location of the property in the image (e.g., blue at the bottom of the image or blue anywhere) is significant.

Query by image similarity, wherein a user provides an entire image as a query target and the system finds images that are visually similar.

Query refinement or systematic browsing. With any of the previous modes of query, the system produces some initial results. A browsing query is one that refines the query by either choosing an image from the previous result set, or by modifying the parameters of the original query in some way. The system in this situation reuses the previous results to generate refined results.

An important concept in content-based retrieval is to determine how similar two pictures are to one another. The notion of similarity (versus

> exact matching as in database systems) is appropriate for visual information because multiple pictures of the same scene will not necessarily "match," although they are identical in content. In the paradigm of content-based retrieval, pictures are not simply matched, but are ranked in order of their similarity to the query image. Another benefit is that content extraction results in very high information compression. The content of an image file may be expressed in as little as several hundred bytes of memory, regardless of the original image size. As an image is inserted into a VIMSYS database, the system extracts the content in terms of generic image properties such as its color, texture, shape and composition, and uses this information for all subsequent database operations. Except for display, the original image is not accessed. Naturally, the VIMSYS model also supports textual attributes as do all standard databases.

Jain, col. 3, line 59 to col. 4, line 57. Nowhere in this cited text does it disclose the subject matter in independent claim 1 of "deriving a set of perceptual semantic categories for representing important semantic cues in the human perception of images, where each semantic category is modeled through a combination of perceptual features that define the semantics of that category and that discriminate that category from other categories, wherein the perceptual features and their combinations are derived at least in part through subjective experiments performed with human observers" (emphasis added). Nowhere in this cited text (or any other part of Jain) is there any disclosure or implication of subjective experiments performed for any reason with human observers.

While the above-cited text of Jain does discuss a "user", it is clear that the user is inputting data for a query. See Jain, col. 4, lines 21-33. Again, there is no disclosure or implication of subjective experiments performed for any reason with human observers.

As shown above, the Examiner asserts the following: "Therefore, Jain clearly teaches the perceptual features (such as color, texture, shape, pattern, and object that are visual to human/user) and their combinations (column 4, lines 1-45) are derived through subjective experiments (the process of obtaining similar properties) performed with human observers (column 4, lines 1-45)." However, Jain does not indicate that "perceptual features (such as color, texture, shape, pattern, and object that are visual to human/user) and their

combinations" are derived through subjected experiments performed with human observers. For instance, Jain states the following:

> ***A visual feature is any property of an image that can be computed using computer-vision and image-processing techniques.*** Examples are hue, saturation, and intensity histograms; texture measures such as edge density, randomness, periodicity, and orientation; shape measures such as algebraic moments, turning angle histograms, and elongatedness. Some of these features are computed globally, i.e., over an entire image, and some are local, i.e., computed over a small region in the image. ***The VIR Engine expresses visual features as image "primitives".*** Primitives can be very general (such as color, shape, or texture) or quite domain specific (face recognition, cancer cell detection, etc.).

Jain, col. 3, line 63 to col. 4, line 9 (emphasis added). It appears that visual features are computed using computer-vision and image-processing techniques and there is no disclosure that such features derived at least in part through subjective experiments performed with human observers.

Furthermore, Jain also states the following:

> ***The VIR Engine looks at the pixel data in the images, and analyzes the data with respect to visual attributes*** such as color, texture, shape, and structure. ***These visual attributes are called "primitives" , and the image characterization is built up from these.*** Images which have been analyzed may then be compared mathematically to determine their similarity value or "score" . Images are analyzed once, and the primitive data is then used for fast comparisons.

Jain, col. 6, lines 23-31 (emphasis added). There is no disclosure that primitives are derived at least in part through subjective experiments performed with human observers, as generally recited in independent claim 1.

Jain further states, under the heading "Primitives", the following:

> Image objects have computable image properties or attributes that can be localized in the spatial domain (arrangement of color), the frequency domain (sharp edge fragments), or by statistical methods (random texture). These ***computed*** features are called primitives. Primitives are either

> global, ***computed*** over an entire image, or local, ***computed*** over smaller regions of the image. For each generic image property such as color, texture, and shape, a number of primitives may be computed. Besides this conceptual definition of a primitive, the specific implementation may also be referred to as a primitive. For instance, the collection of functions to extract and compare an image attribute may be referred to as a primitive.

Jain, col. 7, line 62 to col. 8, line 7. See also col. 12, line 10 to col. 13, line 22, discussing image analysis. It appears that primitives are computed and there is no disclosure that primitives are derived at least in part through subjective experiments performed with human observers, as generally recited in independent claim 1.

Jain also states the following:

> The purpose of the Extensible Engine is to provide to the application developer the flexibility of creating and adding custom-made primitives to the system. For example, a face-matching system might construct primitives called "LeftEye" and "RightEye", and provide an interface that compares faces based on the similarity of their eyes.

Jain, col. 13, lines 42-44. Nonetheless, there is no disclosure in Jain that such primitives are derived through subjective experiments performed with human observers. Jain further states that a "primitive is a semantically meaningful feature of an image. Thus color, texture, and shape are all general image primitives." Jain, col. 13, lines 49-51. Again, there is no disclosure in Jain that primitives are derived at least in part through subjective experiments performed with human observers.

Applicants can find no disclosure in Jain of at least the subject matter in independent claim 1 of "deriving a set of perceptual semantic categories for representing important semantic cues in the human perception of images, where each semantic category is modeled through a combination of perceptual features that define the semantics of that category and that discriminate that category from other categories, wherein the perceptual features and their combinations are derived at least in part through subjective experiments performed with human observers" (emphasis added). Therefore, amended independent claim 1 is patentable over Jain.

Amended independent claim 14 and original, unamended claim 25 recite similar subject matter to the subject matter in independent claim 1. In particular, amended independent claim 14 recites "said data processor operating in accordance with a stored program for determining the semantic meaning of images in accordance with a set of perceptual semantic categories that were previously derived at least in part through subjective experiments performed with human observers and that represent important semantic cues in the human perception of images". Claim 25 recites "comprising program instructions for processing a set of perceptual semantic categories for representing semantic cues related to the manner in which human observers perceive and organize images, the semantic categories being modeled using multidimensional scaling and hierarchical clustering techniques and comprising a combination of perceptual features that define the semantics of a particular category and that discriminate that category from other categories, where the perceptual features and their combinations are derived through subjective experiments performed with human observers". Therefore, based on the arguments given above with respect to independent claim 1, independent claims 16 and 25 are also patentable.

Dependent claims 3-15, 17-24, and 26-28 are all allowable at least by virtue of their dependency from allowable independent claims. Thus, the individual merits of the dependent claims need not be discussed at this juncture.

Conclusion

It is respectfully submitted that the amendment in this paper presents rejected claims in better form for consideration on appeal and therefore should be admitted under 37 C.F.R. §1.116(b)(2). It is further respectfully submitted that claims 1 and 3-28 are patentable over Jain and the 35 U.S.C. §102 rejection to claims 1 and 3-28 should be withdrawn.

Respectfully submitted:

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